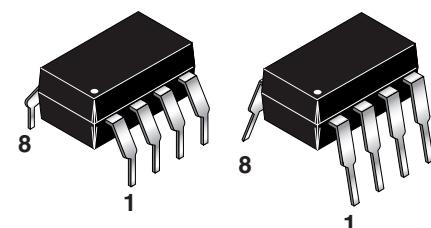
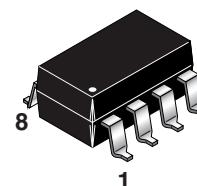


SINGLE-CHANNEL**6N137****HCPL-2601****HCPL-2611****DUAL-CHANNEL****HCPL-2630****HCPL-2631****DESCRIPTION**

The 6N137, HCPL-2601/2611 single-channel and HCPL-2630/2631 dual-channel optocouplers consist of a 850 nm AlGaAs LED, optically coupled to a very high speed integrated photodetector logic gate with a strobeable output. This output features an open collector, thereby permitting wired OR outputs. The coupled parameters are guaranteed over the temperature range of -40°C to +85°C. A maximum input signal of 5 mA will provide a minimum output sink current of 13 mA (fan out of 8).

An internal noise shield provides superior common mode rejection of typically 10 kV/μs. The HCPL- 2601 and HCPL- 2631 has a minimum CMR of 5 kV/μs.

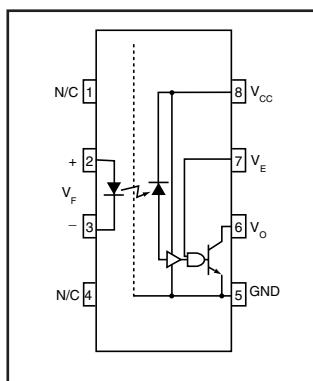
The HCPL-2611 has a minimum CMR of 10 kV/μs.

**FEATURES**

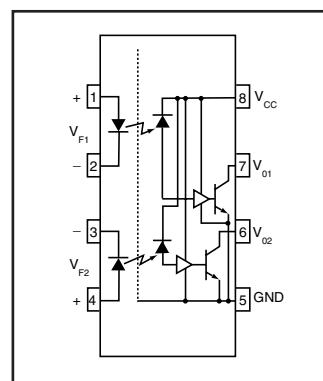
- Very high speed-10 MBit/s
- Superior CMR-10 kV/μs
- Double working voltage-480V
- Fan-out of 8 over -40°C to +85°C
- Logic gate output
- Strobeable output
- Wired OR-open collector
- U.L. recognized (File # E90700)

APPLICATIONS

- Ground loop elimination
- LSTTL to TTL, LSTTL or 5-volt CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supplies
- Pulse transformer replacement
- Computer-peripheral interface



6N137
HCPL-2601
HCPL-2611



HCPL-2630
HCPL-2631

TRUTH TABLE

(Positive Logic)

Input	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H
H	NC	L
L	NC	H

A 0.1 μF bypass capacitor must be connected between pins 8 and 5.
(See note 1)

SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

HCPL-2630

HCPL-2631

ABSOLUTE MAXIMUM RATINGS (No derating required up to 85°C)

Parameter	Symbol	Value	Units
Storage Temperature	T_{STG}	-55 to +125	°C
Operating Temperature	T_{OPR}	-40 to +85	°C
Lead Solder Temperature	T_{SOL}	260 for 10 sec	°C
EMITTER			
DC/Average Forward	I_F	50	mA
Input Current		30	
Enable Input Voltage	V_E	5.5	V
Not to exceed V_{CC} by more than 500 mV			
Reverse Input Voltage	V_R	5.0	V
Power Dissipation	P_I	100	mW
Dual channel (Each channel)		45	
DETECTOR			
Supply Voltage	V_{CC} (1 minute max)	7.0	V
Output Current	I_O	50	mA
Dual channel (Each channel)		50	
Output Voltage	V_O	7.0	V
Collector Output	P_O	85	mW
Dual channel (Each channel)		60	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Units
Input Current, Low Level	I_{FL}	0	250	µA
Input Current, High Level	I_{FH}	*6.3	15	mA
Supply Voltage, Output	V_{CC}	4.5	5.5	V
Enable Voltage, Low Level	V_{EL}	0	0.8	V
Enable Voltage, High Level	V_{EH}	2.0	V_{CC}	V
Low Level Supply Current	T_A	-40	+85	°C
Fan Out (TTL load)	N		8	

* 6.3 mA is a guard banded value which allows for at least 20 % CTR degradation. Initial input current threshold value is 5.0 mA or less

SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

HCPL-2630

HCPL-2631

ELECTRICAL CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit	
EMITTER	($I_F = 10 \text{ mA}$)			1.8			
Input Forward Voltage	$T_A = 25^\circ\text{C}$	V_F		1.4	1.75	V	
Input Reverse Breakdown Voltage	($I_R = 10 \mu\text{A}$)	B_{VR}	5.0			V	
Input Capacitance	($V_F = 0, f = 1 \text{ MHz}$)	C_{IN}		60		pF	
Input Diode Temperature Coefficient	($I_F = 10 \text{ mA}$)	$\Delta V_F/\Delta T_A$		-1.4		mV/°C	
DETECTOR							
High Level Supply Current	Single Channel	I_{CCH}		7	10	mA	
	Dual Channel		($V_{CC} = 5.5 \text{ V}, I_F = 0 \text{ mA}$)		10		15
Low Level Supply Current	Single Channel	I_{CCL}		9	13	mA	
	Dual Channel		($V_{CC} = 5.5 \text{ V}, I_F = 10 \text{ mA}$)		14		21
Low Level Enable Current		$V_{CC} = 5.5 \text{ V}, V_E = 0.5 \text{ V}$	I_{EL}		-0.8	-1.6	mA
High Level Enable Current		($V_{CC} = 5.5 \text{ V}, V_E = 2.0 \text{ V}$)	I_{EH}		-0.6	-1.6	mA
High Level Enable Voltage		($V_{CC} = 5.5 \text{ V}, I_F = 10 \text{ mA}$)	V_{EH}	2.0			V
Low Level Enable Voltage		($V_{CC} = 5.5 \text{ V}, I_F = 10 \text{ mA}$) (Note 3)	V_{EL}			0.8	V

SWITCHING CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5 \text{ V}$, $I_F = 7.5 \text{ mA}$ Unless otherwise specified.)

AC Characteristics	Test Conditions	Symbol	Min	Typ**	Max	Unit	
Propagation Delay Time to Output High Level	(Note 4) ($T_A = 25^\circ\text{C}$) ($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Fig. 12)	T_{PLH}	20	45	75	ns	
					100		
Propagation Delay Time to Output Low Level	(Note 5) ($T_A = 25^\circ\text{C}$) ($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Fig. 12)	T_{PHL}	25	45	75	ns	
					100		
Pulse Width Distortion	($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Fig. 12)	$ T_{PHL}-T_{PLH} $		3	35	ns	
Output Rise Time (10-90%)	($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Note 6) (Fig. 12)	t_r		50		ns	
Output Fall Time (90-10%)	($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Note 7) (Fig. 12)	t_f		12		ns	
Enable Propagation Delay Time to Output High Level	($I_F = 7.5 \text{ mA}, V_{EH} = 3.5 \text{ V}$) ($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Note 8) (Fig. 13)	t_{ELH}		20		ns	
Enable Propagation Delay Time to Output Low Level	($I_F = 7.5 \text{ mA}, V_{EH} = 3.5 \text{ V}$) ($R_L = 350 \Omega, C_L = 15 \text{ pF}$) (Note 9) (Fig. 13)	t_{EHL}		20		ns	
Common Mode Transient Immunity (at Output High Level)	($T_A = 25^\circ\text{C}$) $ V_{CM} = 50 \text{ V}$, (Peak) ($I_F = 0 \text{ mA}, V_{OH} (\text{Min.}) = 2.0 \text{ V}$)	$ CM_H $				V/μs	
6N137, HCPL-2630	($R_L = 350 \Omega$) (Note 10)				10,000		
HCPL-2601, HCPL-2631	(Fig. 14)			5000	10,000		
HCPL-2611	$ V_{CM} = 400 \text{ V}$		10,000	15,000			
Common Mode Transient Immunity (at Output Low Level)	($R_L = 350 \Omega$) ($I_F = 7.5 \text{ mA}, V_{OL} (\text{Max.}) = 0.8 \text{ V}$)	$ CM_L $		10,000		V/μs	
6N137, HCPL-2630	$ V_{CM} = 50 \text{ V}$ (Peak)						
HCPL-2601, HCPL-2631	($T_A = 25^\circ\text{C}$)			5000	10,000		
HCPL-2611	(Note 11) (Fig. 14)		10,000	15,000			

SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

HCPL-2630

HCPL-2631

TRANSFER CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ Unless otherwise specified.)

DC Characteristics	Test Conditions	Symbol	Min	Typ**	Max	Unit
High Level Output Current ($V_{CC} = 5.5\text{ V}$, $V_O = 5.5\text{ V}$ ($I_F = 250\text{ }\mu\text{A}$, $V_E = 2.0\text{ V}$) (Note 2)		I_{OH}			100	μA
Low Level Output Current ($V_{CC} = 5.5\text{ V}$, $I_F = 5\text{ mA}$ ($V_E = 2.0\text{ V}$, $I_{OL} = 13\text{ mA}$) (Note 2)		V_{OL}		.35	0.6	V
Input Threshold Current ($V_{CC} = 5.5\text{ V}$, $V_O = 0.6\text{ V}$, $V_E = 2.0\text{ V}$, $I_{OL} = 13\text{ mA}$)		I_{FT}		3	5	mA

ISOLATION CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ Unless otherwise specified.)

Characteristics	Test Conditions	Symbol	Min	Typ**	Max	Unit
Input-Output (Relative humidity = 45%)						
Insulation Leakage Current ($T_A = 25^\circ\text{C}$, $t = 5\text{ s}$ ($V_{I-O} = 3000\text{ VDC}$) (Note 12)		I_{I-O}			1.0*	μA
Withstand Insulation Test Voltage (RH < 50%, $T_A = 25^\circ\text{C}$) (Note 12) ($t = 1\text{ min.}$)		V_{ISO}	2500			V_{RMS}
Resistance (Input to Output) ($V_{I-O} = 500\text{ V}$) (Note 12)		R_{I-O}		10^{12}		Ω
Capacitance (Input to Output) ($f = 1\text{ MHz}$) (Note 12)		C_{I-O}		0.6		pF

** All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

NOTES

1. The V_{CC} supply to each optoisolator must be bypassed by a $0.1\mu\text{F}$ capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins of each device.
2. Each channel.
3. Enable Input - No pull up resistor required as the device has an internal pull up resistor.
4. t_{PLH} - Propagation delay is measured from the 3.75 mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.
5. t_{PHL} - Propagation delay is measured from the 3.75 mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.
6. t_r - Rise time is measured from the 90% to the 10% levels on the LOW to HIGH transition of the output pulse.
7. t_f - Fall time is measured from the 10% to the 90% levels on the HIGH to LOW transition of the output pulse.
8. t_{ELH} - Enable input propagation delay is measured from the 1.5 V level on the HIGH to LOW transition of the input voltage pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.
9. t_{EHL} - Enable input propagation delay is measured from the 1.5 V level on the LOW to HIGH transition of the input voltage pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.
10. CM_H - The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high state (i.e., $V_{OUT} > 2.0\text{ V}$). Measured in volts per microsecond ($\text{V}/\mu\text{s}$).
11. CM_L - The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the low output state (i.e., $V_{OUT} < 0.8\text{ V}$). Measured in volts per microsecond ($\text{V}/\mu\text{s}$).
12. Device considered a two-terminal device: Pins 1,2,3 and 4 shorted together, and Pins 5,6,7 and 8 shorted together.

SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

HCPL-2630

HCPL-2631

TYPICAL PERFORMANCE CURVES

Fig.1 Low Level Output Voltage vs. Ambient Temperature

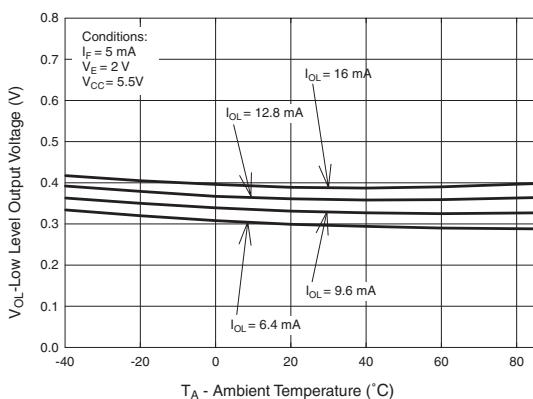


Fig. 2 Input Diode Forward Voltage vs. Forward Current

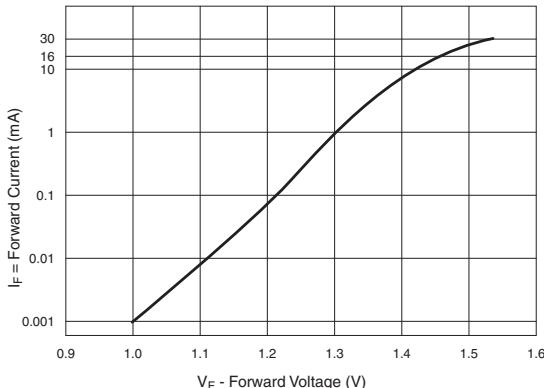


Fig.3 Switching Time vs. Forward Current

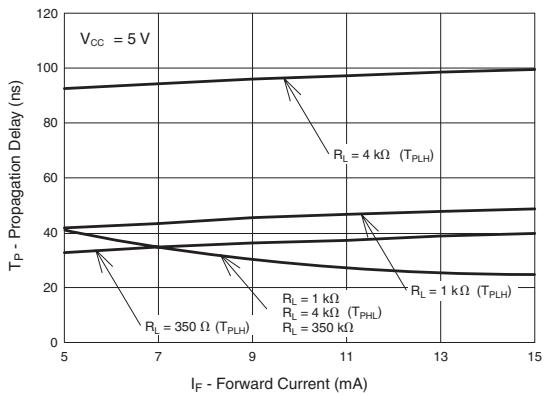


Fig. 4 Low Level Output Current vs. Ambient Temperature

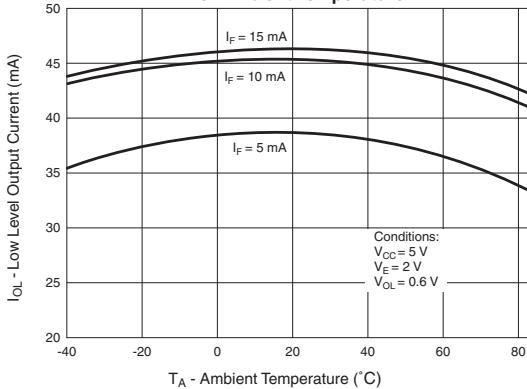


Fig. 5 Input Threshold Current vs. Ambient Temperature

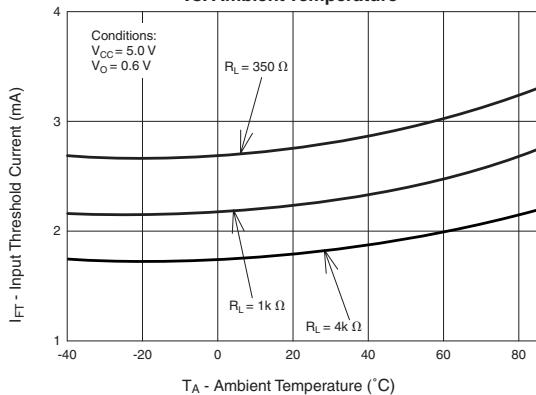
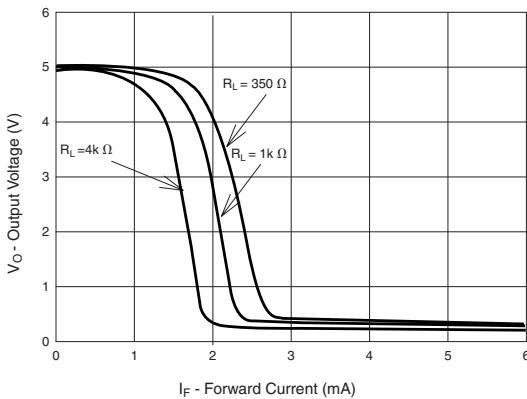


Fig. 6 Output Voltage vs. Input Forward Current



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6N137

HCPL-2601

HCPL-2611

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HCPL-2630

HCPL-2631

Fig. 7 Pulse Width Distortion vs. Temperature

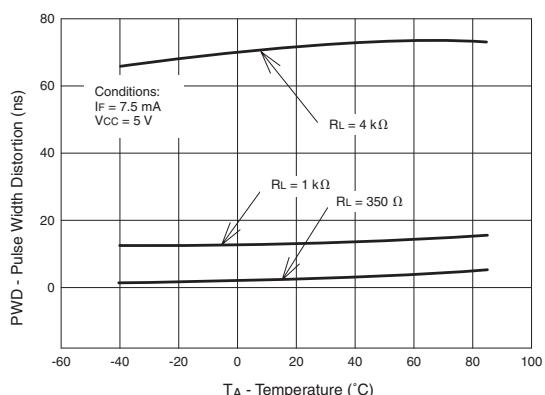


Fig. 9 Enable Propagation Delay vs. Temperature

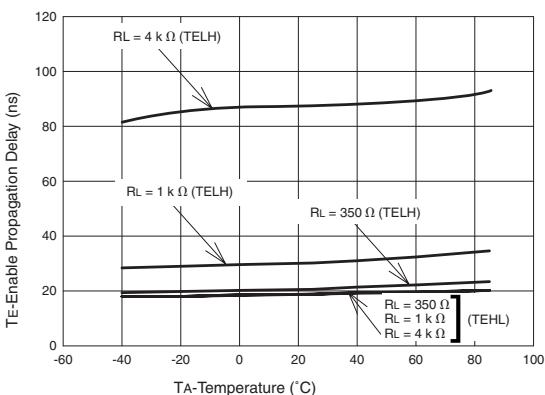


Fig. 8 Rise and Fall Time vs. Temperature

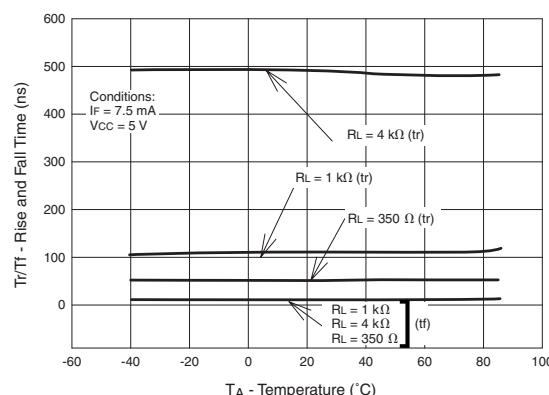


Fig. 10 Switching Time vs. Temperature

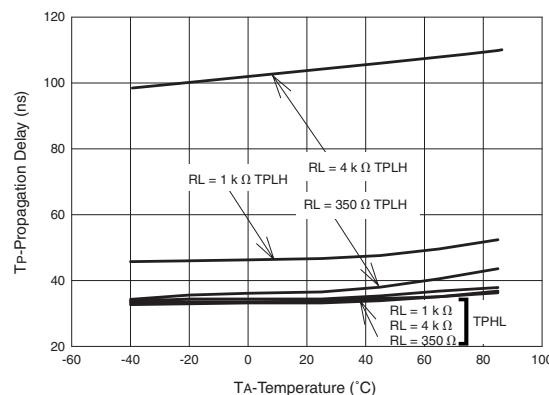
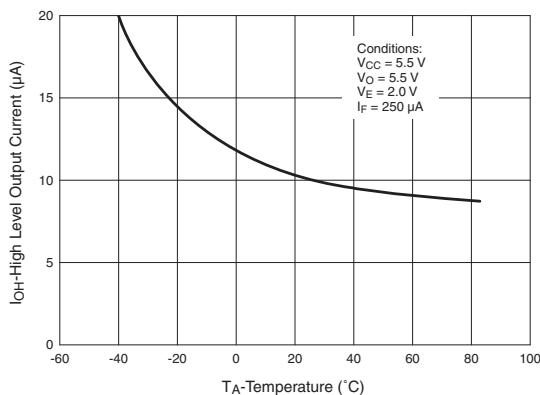


Fig. 11 High Level Output Current vs. Temperature



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6N137
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HCPL-2631

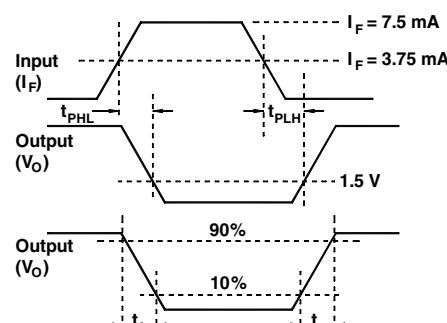
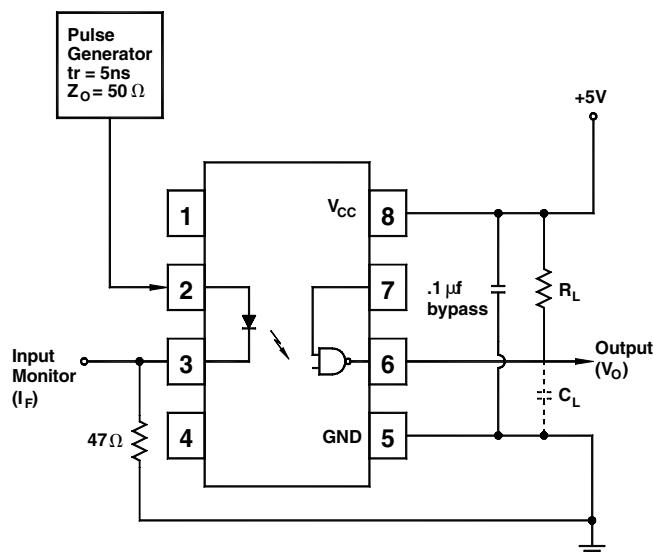


Fig. 12 Test Circuit and Waveforms for t_{PLH} , t_{PHL} , t_r and t_f .

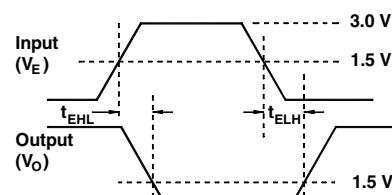
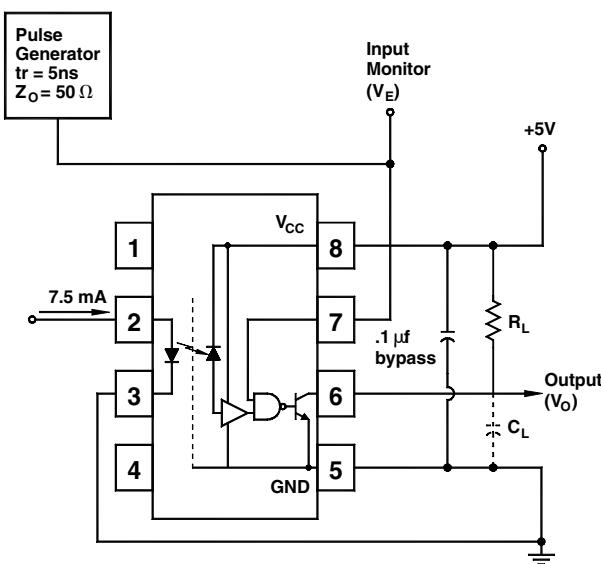


Fig. 13 Test Circuit t_{EHL} and t_{ELH} .

SINGLE-CHANNEL

6N137
HCPL-2601
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DUAL-CHANNEL
HCPL-2630
HCPL-2631

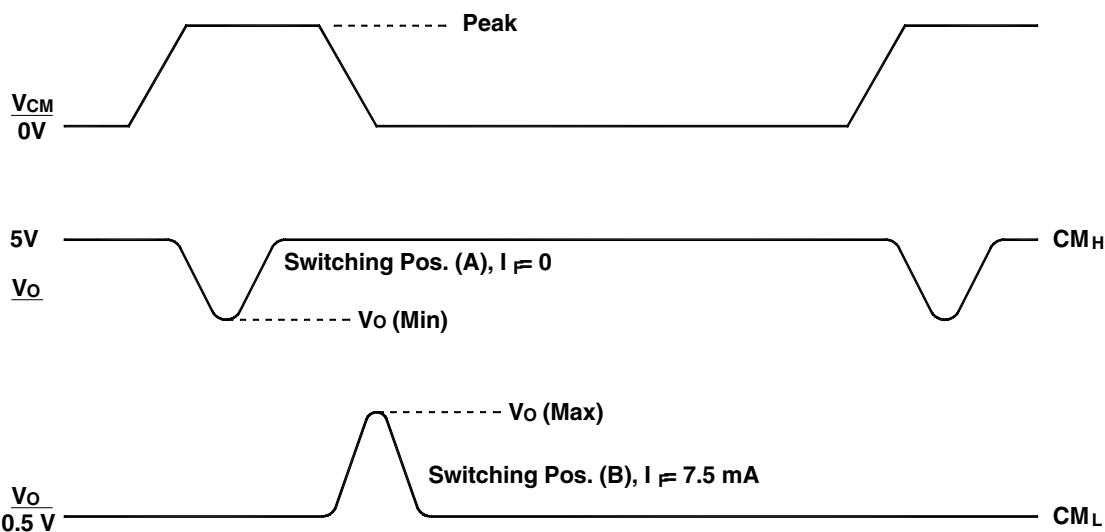
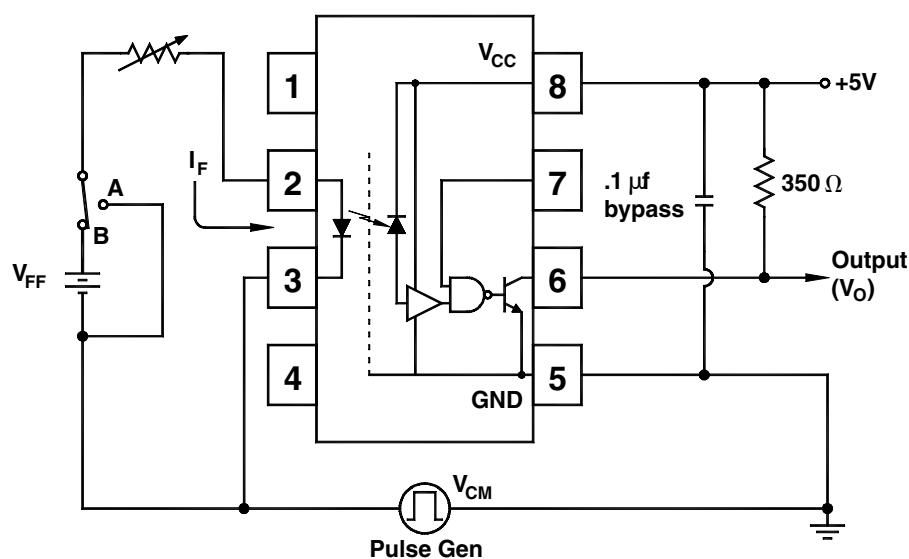


Fig. 14 Test Circuit Common Mode Transient Immunity

SINGLE-CHANNEL

6N137

HCPL-2601

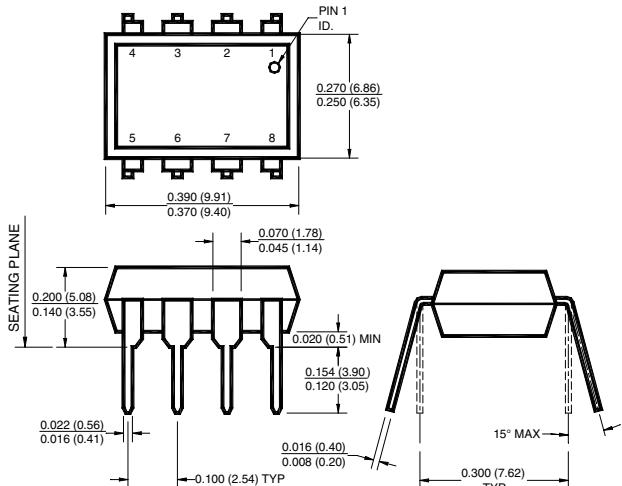
HCPL-2611

DUAL-CHANNEL

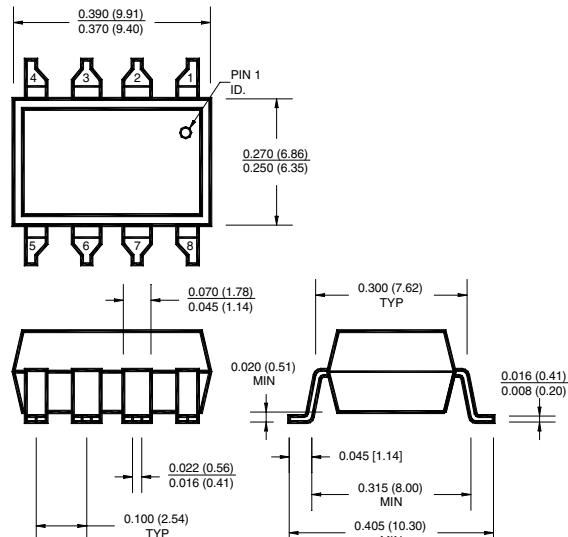
HCPL-2630

HCPL-2631

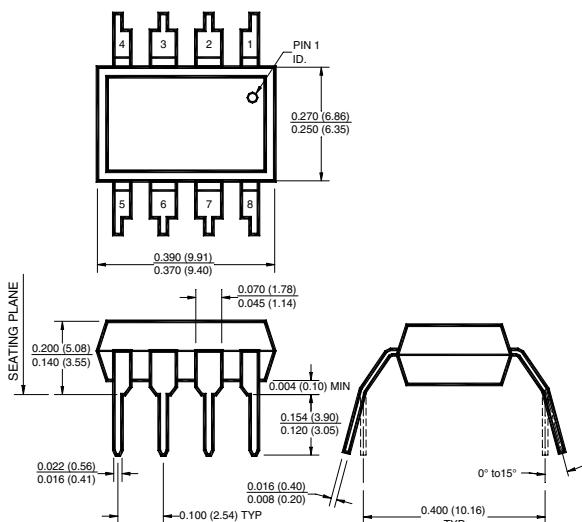
Package Dimensions (Through Hole)



Package Dimensions (Surface Mount)



Package Dimensions (0.4"Lead Spacing)



NOTE

All dimensions are in inches (millimeters)

SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

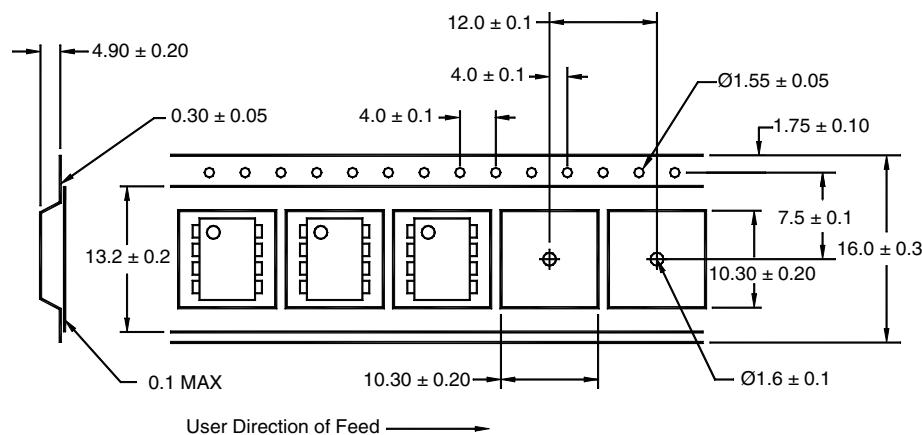
HCPL-2630

HCPL-2631

ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing

QT Carrier Tape Specifications ("D" Taping Orientation)



SINGLE-CHANNEL

6N137

HCPL-2601

HCPL-2611

DUAL-CHANNEL

HCPL-2630

HCPL-2631

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